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What states can do to adapt to climate change in the Baltic Sea

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A B S T R A C T

States can play a key role in adaptation to climate change. Given the transboundary nature of the Baltic Sea, its coastal states have much to gain from cooperation to tackle eutrophication and flood risks. Since eight out of nine coastal states are EU Member States, the EU is expected to steer their efforts. Indeed, EU legislation and the EU adaptation strategy, including one specifically for the Baltic Sea Region are in place to activate state actors. They cover crucial aspects for the management of the Baltic Sea, namely reducing eutrophication and managing flood risks. However, despite the holistic goals – achieving good environmental status and reducing the adverse effects of flooding – these Directives mainly prescribe assessments and the adoption of plans. It is left to the coastal states to design ambitious objectives and take measures or rather rely on exemptions. While all coastal states have strategies in place, progress in the achievement of these goals is not easy to measure. With regard to environmental protection, HELCOM fills this gap by providing additional steering and coordination through more stringent targets for nutrients, which address the impact of climate change on eutrophication. With regard to flood risks, the Council of the Baltic Sea States seems to have started to consider taking a similar role by developing a more concrete and coordinated flood risk strategy for the marine region.

1. Introduction

Admittedly, climate change can bring benefits to northern Europe, like longer growth seasons and more tourists. However, climate change also reinforces existing pressures making adaptation a necessity. The Baltic Sea is already grappling with eutrophication. Increased land and water temperatures form additional threats [1]. How can the expansion of dead zones be halted, let alone reversed, in a changing climate? The challenges for the Baltic Sea Region are related to the fields where humanity is currently pushing against planetary boundaries, eutrophication and climate change being just two of them [2]. They are reinforced by other threats: biodiversity loss, pollution with hazardous substances, marine litter and overfishing. Pollution is not the only issue that urgently needs to be dealt with. Even though they are relatively low compared to other regions, flood risks are expected to increase due to sea level rise, altering rain and snow patterns and more frequent and severe storms.

Given the halfhearted international efforts to mitigate climate change, and its potential to reinforce existing problems, it is useful to start preparing to limit adverse effects and increase resilience. When it comes to adaptation to climate change, the big question is who should adapt to what and how? In this article, I will analyze the contribution of states in steering adaptation to climate change efforts in the Baltic Sea region. It is not self-evident that state intervention is required to address climate change impacts. Arguably, private actors can adapt themselves to climate change. I will analyze two of the biggest adaptation to climate change challenges for the Baltic Sea: eutrophication and flood risk management. These tasks are not easily taken up by individuals acting on their own.

States can play a key role. They can organize the collective, counter the free-rider and temporal discounting problem and plan, take and enforce measures to adapt for the entire society, with the inclusion of vulnerable groups [3]. State actions can result in reduced or enhanced adaptation efforts. Positive action includes regulating behavior by mainstreaming adaptation in their legislation, building institutions, providing resources and increasing knowledge and awareness [4]. Unfortunately, states can find many barriers on their way that hinder adaptation [5,6]. Nevertheless, progress is tangible, in particular in the EU, even though it is not easy to measure due to a lack of data, which is compounded by differences in reporting on adaptation [7].

States have committed to take action, first, as they ratified the United Nations Framework Convention on Climate Change (UNFCCC), which calls states not only to mitigate, but also to adapt to climate change [e.g. 8, Art. 4]. Second, as the impacts of climate change are becoming discernible, many states are strengthening their adaptation commitment to protect people, livelihoods and ecosystems [e.g. 9, Art. 7, 10]. Interestingly, states do not wait to undertake adaptation until international or European obligations arise. Apparently, the urge to adapt is autonomously felt at state level [7] and below, for instance by the cities united in the C40 cities network [11].

Given the transboundary nature of the Baltic Sea and its challenges, the coastal states[1] have much to gain from cooperation to address

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[1] The Baltic Sea coastal states are: Denmark, Finland, Sweden, Germany, Estonia, Latvia, Lithuania, Poland and Russia and the non-coastal drainage basin states are: Belarus, Czech Republic, Norway, Slovakia and Ukraine.

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eutrophication and flood risk management. Cooperation enables them to achieve economies of scale and learn by sharing practices (as recommended by the 2015 EUSBSR Action Plan). In the Baltic Sea region, cooperation between the coastal states is facilitated through their accession to the 1992 Helsinki Convention, of which HELCOM is the principal decision-making body. The EU is a party to the Helsinki Convention as well, which has as a legal consequence that it has become part of the EU legal order. This is particularly relevant as eight out of nine coastal states are EU Members States, which gives the EU a strong position in this region.

The main research question is to what extent are the Baltic Sea coastal states obliged to take action and cooperate with regard to reducing eutrophication and manage flood risks in the process of adapting to climate change. It is researched through a desktop study. I analyzed the EU Adaptation Strategy, the EU Marine Strategy Framework Directive and the Floods Directive, the 2009 EU Strategy for the Baltic Sea Region (EUSBSR), the 2007 Baltic Sea Action Plan and the 2013 Baltadapt plan. With regard to implementation, I relied on the information that is publicly available on websites of the EU, HELCOM, the Council of the Baltic Sea States (CBSS) and the Northern Dimension Environmental Partnership (NDEP).

2. The EU Adaptation Strategy

In order to understand what the EU expects from the coastal Member States, it is useful to look at the EU Adaptation Strategy [12]. The legal background for this strategy is Article 4 UNFCCC, which prescribes that the parties (including the EU and its Member States) adopt adaptation strategies and report them to the UNFCCC secretariat. The EU Adaptation Strategy is intended to complement national, regional and local efforts with an integrated approach at EU level to facilitate coordination and the exchange of best practices [12]. The Commission sees an important role for the EU, given that the impact of climate change transcends the boundaries of individual countries, which occurs for instance in river basins and marine regions [13]. In addition, the EU has to act in those fields where it has established extensive policies and legislation. This applies to many sectors, among them the harmonized environmental legislation, the cohesion policy and the common policies for agriculture and fisheries [13].

Measuring the effect of Europe's Adaptation Strategy in the Baltic Sea Region requires taking a closer look at its three objectives. The first objective is to promote action by the Member States, so at least they should establish national adaptation strategies. This worked for the Baltic Sea region, as almost every coastal state has an adaptation strategy [14, Countries]. Regional cooperation in adaptation is not an objective. Yet it has taken place, as steps were taken to develop an adaptation strategy for the entire Baltic Sea. The second objective is to improve decision-making by addressing knowledge gaps by funding research through European research programmes and sharing this information through the climateADAPT website [14]. BaltReg is one of these research projects. The third objective is directed at the EU, as it focuses on climate-proofing EU action by mainstreaming adaptation measures into EU legislation and policies. The strategy mentions various instruments to be used, including issuing guidance documents for the CAP and the CFP, revising European standards for energy, transport and buildings, providing financial support through EU funds, and promoting insurance [12].

Thus in order to measure progress from a legal perspective, the crucial point is to what extent the strategies and the mainstreaming of climate proofing in EU legislation results in obligations for the Member States to take action to adapt to climate change. Eutrophication and flood risk management are tackled by the Water Framework Directive, its daughter Directives, the Marine Strategy Framework Directive and the Floods Directive. However, these Directives have a predominantly procedural character, focusing on improving decision-making through assessments. This reduces the extent to which such Directives oblige Member States to take concrete measures to adapt [15,16]. Since the Marine Strategy Directive is particularly relevant to assess the adaptation commitments flowing from it for the Baltic Sea Region, we will see how the mainstreaming of adaptation has played out by taking a closer look at this Directive.

3. The Marine Strategy Framework Directive

Existing EU law addresses human activities impacting the marine environment in a sectoral manner. The addition of the Marine Strategy Framework Directive (MSFD) is intended to provide an overarching framework to ensure coherence, consistency and integration for the marine environment [17, Art. 1]. It complements existing EU legislation, in particular the Water Framework Directive (WFD). Like the WFD, the MSFD takes an ecosystem –based approach to the management of the marine environment [as explicitly mentioned in 17, Art. 1(3)]. The purpose of the MSFD is to achieve or maintain good environmental status in the EU marine waters by 2020 at the latest. The idea is that this will prevent a deterioration of the environmental quality of marine waters due to climate change [18]. The development of the marine strategies should take place every six years and their implementation should take place in cooperation with other (Member) States in marine regions, like the Baltic Sea [17, Art. 5], and the institutions of regional sea conventions can be used for this purpose [17, Art. 6].

The first step is an assessment of the features and characteristics coupled with the combined human pressures and impacts on the environmental status and an economic and social analysis. The Member States need to establish targets and indicators of good environmental status [17, Arts. 9–10]. Next, the Member States have to establish coordinated monitoring programmes [17, Art. 11]. Finally, the Member States have to identify the measures that need to be taken, taking sustainable development into due consideration, in particular the social and economic impacts of the envisaged measures. They only need to take measures that are cost-effective and technically feasible. If a human activity is likely to have a significant impact on the marine environment, the competent authority should respond appropriately to achieve the objectives of the MSFD. In case the EU should take action, the Commission needs to be notified [17, Art. 15].

Similar to the WFD, the MSFD contains a limited list of exemptions that can be invoked in case the 2020 deadline is not met [17, Art. 14]. The five MSFD exemptions are:

a) action or inaction for which the Member State concerned is not responsible;
b) natural causes;
c) force majeure;
d) modifications or alterations to the physical characteristics of marine waters brought about by actions taken for reasons of overriding public interest which outweigh the negative impact on the environment, including any transboundary impact; and
e) natural conditions which do not allow timely improvement in the status of the marine waters concerned.

Exemption a) needs to be notified to the European Commission, the other exemptions require a Member State to take appropriate ad hoc measures to continue pursuing the environmental targets, to prevent further deterioration and to mitigate the adverse impacts at the level of the marine region or sub-region or the marine waters of other Member States. Moreover, modifications or alterations may not permanently preclude or compromise the achievement of good environmental status at the level of the marine region or sub-region or the marine waters of other Member States.

Given that climate change is not mentioned as such in the provisions of the MSFD, it is not clear whether climate change impacts could be acceptable as a justification for not achieving the 2020 deadline or are

expected to lead to increased efforts. Only the preamble to the MSFD mentions climate change, but it does not answer this question. It only warns that given the dynamic nature of marine ecosystems and their natural variability, and given that the pressures and impacts on them may vary according to different patterns of human activity and the impact of climate change, the determination of good environmental status may have to be adapted over time. It adds that this also means that the programmes of measures for the protection and management of the marine environment should be flexible and adaptive and take account of the scientific and technological developments and that the strategies should be regularly updated, which is prescribed to take place every 6 years.

With regard to biodiversity protection, a crucial aspect of good environmental status, marine protected areas (MPAs) had already been established under the Birds and Habitats Directives. However, while these Directives oblige the Member States to ensure a favorable conservation status through the establishment and maintenance of protected areas, they do not contain a deadline for achievement of this goal. According to the preamble to the MSFD, these Directives offer an important contribution to the achievement of good environmental status. This applies in particular if MPAs are sufficiently large [19]. In the literature, there is, however, a debate over the importance for biodiversity of MPAs versus sustainable fisheries management, which would benefit all marine waters [20]. Interestingly, the MSFD takes a more holistic approach as it aims to achieve good environmental status in the entire sea, not only in MPAs, yet it maintains a distinction between MPAs and other protected areas [e.g. Art. 21 in [17] obliges to report specifically on progress in protected areas].

Thus, the MSFD obligation to achieve good environmental status is weakened by three loopholes. First, it is possible that Member States may rather invoke an exemption than take action [21], as has happened under the WFD regime as well, and perhaps use climate change impacts as a justification. Second, Member States may lower the good environmental status indicators on the basis of economic concerns, something which is not possible under the WFD. The MSFD not only allows but prescribes that economic concerns should be taken in due consideration in the establishment of indicators for good environmental status [17, Annex IV, sub 9]. Third, Member States are only required to take measures that are cost-effective and technically feasible. Therefore, outside MPAs, social and economic concerns may play a large role. It will depend on the ambitions and adaptation efforts of the coastal states to what extent good environmental status will be achieved and maintained in the EU marine waters of the Baltic Sea despite the impacts of climate change.

4. The Floods Directive

One of the main threats of climate change is the increase of flood risks. Even where flood risks are currently relatively low, it is important to anticipate further sea level rise and an increase in extreme weather events when planning for infrastructure and other coastal developments. The implementation of the Floods Directive (FD) is expected to raise awareness to floods. The focus of the Directive is not to prevent flood events, but to reduce their adverse effects through flood risk management [22, Art. 1]. The main obligations of the Directive are that the Member States regularly do assessments and create flood risk management plans and informative flood risk and flood hazard maps. The FD is expected to result in improved decision-making due to increased awareness of governments and citizens of flood risks and hazards [23]. The Directive does not prescribe that this should lead to an increased safety level or measures which reduce the adverse effects of floods.

Given that flood risks around the Baltic Sea are expected to increase due to climate change [24], the coastal states should consider taking measures to address flood risks and hazards by paying attention to flood risks in spatial planning in coastal areas and restricting new developments in flood prone areas, e.g. through the establishment of green infrastructure. At the experimental level, this is already taking place [25]. In addition, they could opt to prepare for a flood event by establishing an early warning system, and emergency and response plans [26]. The FD prescribes none of the above. It leaves it to the Member States to set their own objectives as they prepare their six-yearly flood risk management plans in sync with their river basin management plans [22, Arts. 3 et seq.] and as long as they involve the public [22, Arts. 7 and 9].

If states take measures, cooperation with other coastal states can be useful to benefit from economy of scale effects of shared surveillance data, an early warning system and emergency assistance. With regard to cooperation, the FD is not linked to the marine regions established by the MSFD, but to the river basin districts established by the WFD. However, Member States can assign coordinating tasks to another authority than the river basin authority [22, Art. 3]. This does not appear to have happened for the Baltic Sea. Here, it is a drawback that the scope of the MSFD and the Helsinki Convention is limited to environmental protection and that therefore HELCOM cannot be used to coordinate the management of flood risks. However, there are more institutions in the Baltic Sea Region and flood risk management falls under the tasks of the Council of the Baltic Sea States (CBSS).

5. Adaptation in the Baltic Sea Region

The Adaptation strategy for the Baltic Sea can be found in various documents. The first in time is the 2007 HELCOM Baltic Sea Action Plan [27]. It aims at achieving good environmental status for the Baltic Sea by 2021. Among its objectives is to have a Baltic Sea unaffected by eutrophication. This objective is elaborated in nutrient reduction caps for each coastal state. These caps have been updated in ministerial declarations in 2010 and 2013 on the basis of monitoring results and scientific models. While the original caps aim to return to natural nutrient levels, the 2013 declaration mentions the impact of climate change and economic benefits as reasons to strengthen the efforts to reduce the nutrient load. The Action Plan is supplemented by recommendations, which should be implemented in national action plans, policy documents and legislation. For coastal EU Member States, the Action Plan is an important step in the implementation of their obligations under the WFD and the MSFD.

The European Union Strategy for the Baltic Sea Region (EUSBSR) was adopted in 2009 [28]. It builds on the HELCOM Action Plan, but encompasses more than water quality. Next to saving the sea, it has two other objectives: connecting the region and increasing prosperity. Adaptation to climate change is not a separate objective, but part of these objectives. Of course, these objectives are themselves also interdependent. The EUSBRS is complemented by an Action Plan, revised in 2015, and national strategies for water management and adaptation. The 2015 EUSBSR Action Plan includes among its five priority areas the reduction of nutrient inputs to acceptable levels to save the sea and adaptation to climate change to increase prosperity, while disaster management should improve security [29]. Indeed the climate part in the Action Plan warns that the coastal states should pay attention to eutrophication, urban planning and disaster management in their national adaptation strategies. It goes a step further than the EU Adaptation Strategy as the Action Plan calls for the establishment of macro-regional strategies to address cross border spillover effects of specific disasters and promote strengthened cooperation in prevention, preparedness and response in the management of common (not necessarily only climate related) risks [29].

The Strategy and the Action plan offer guidance with regard to priorities and objectives. However, their targets are quite vague and, even though there is an Action Plan, the development and implementation of concrete actions is left to the Member States. They should cooperate using existing institutions. The plural is appropriate here, because there are many institutions. The marine environment is

guarded by HELCOM, which has established specific maximum nutrient targets for each of the parties to the Helsinki Convention, but also falls within the realms of the Northern Dimension Environmental Partnership (NDEP) and the Council of the Baltic Sea States (CBSS). Flood risk management falls under climate, which is coordinated by the CBSS [29]. The CBSS facilitates access to EU financing and cooperation among stakeholders, including other organizations such as HELCOM, the Nordic Council of Ministers, the NDEP and the Swedish institute [29]. A more specific flood risk plan for the Baltic Sea is still under development.

The EUSBSR is complemented by the 2013 Strategy for Adaptation in the Baltic Sea Region (Baltadapt), developed by expert institutions and funded by the EU Baltic Sea Region programme [30]. The main objectives of the Baltadapt strategy 2013 are:

1. Building and sharing knowledge about climate change adaptation in the Baltic Sea Region
2. Connecting the Baltic Sea Region for climate change adaptation
3. Mainstreaming climate change adaptation in the Baltic Sea Region
4. Financing climate change adaptation in the Baltic Sea Region

Mainstreaming climate change adaptation in environmental agreements and directives and implementing these existing commitments can limit environmental climate impacts. For instance, the Baltadapt strategy mentions that good water quality in the Baltic Sea can be achieved by nutrient reduction measures. By contrast, higher water temperatures, reduced salinity or a different distribution of commercial fish stocks, are seen to require socio-economic adaptation efforts. Here, one would expect that taking mitigation measures to curb emissions of greenhouse gases would at least be mentioned. A similar pessimistic view of climate change is reinforced by the Baltadapt Strategy's proposal to alter goals and objectives. For instance, the habitat types labelled as “mudflats and sandflats not covered by seawater at low tide” in the Habitats Directive will decrease and eventually disappear with increasing sea level rise. According to the Habitats Directive, one is obliged to keep or restore the area with the specified habitat. Eventually that becomes impossible if climate change continues unabated.

Therefore, with regard to nature conservation, Baltadapt proposes a revision of EU Directives to include the impacts of climate change as a justification for changing conservation objectives. By contrast, it proposes a revision of the Nitrates Directive to create stricter objectives. Reductions in nutrient loads to the sea constitute one of the few adaptation measures available to reduce the increase in eutrophication caused by climate change. This has not taken place at the EU level, despite the Commission's ambition to climate-proof legislation. Without waiting for a revision of the Nitrates Directive, the Baltic Sea coastal states adhere to stricter nutrient caps through a HELCOM agreements. This clearly shows the added value of HELCOM, and as these caps are agreed on, reviewed and revised by the ministers of the coastal states, a high level of implementation is expected [31]. Perhaps the CBSS could develop a similar initiative to address coastal flood risks.

6. Compliance

Due to UNFCC reporting obligations and European Commission reports, it is known that the Baltic coastal states have created adaptation strategies. This is also made visible in the Commission's adaptation preparedness overview [14], as it shows which member states adopted an adaptation strategy and which adopted an adaptation plan [32]. However, both at the international and at the EU level, the focus appears to be on the assessment phase rather than on taking adaptation action and monitoring its effectiveness. Which measures states actually take is hard to monitor and evaluate, due to the lack of indicators and monitoring methodologies [12].

According to the Boston Consulting Group report Turning Adversity into Opportunity [33], the international agreements and conventions to improve the environmental status of the Baltic Sea are being implemented at a low rate even though there is consensus on the primary threats facing the region: eutrophication, hazardous substances and overfishing. Their recommendations include that actions that are already agreed on should be implemented and that regional bodies enforce these actions and track progress. They underline that the Baltic Sea's health is not only an environmental concern but also an important economic and social one. If measures are not taken, this undermines the outlook for biodiversity and human activities, affecting in particular tourism and fisheries.

HELCOM seems to be the most important institution when it comes to influencing the environmental behavior of the coastal states, but it has limited enforcement options. It relies on the commitment of its parties to implement the Helsinki Convention, the Baltic Sea Action Plan, ministerial declarations or recommendations. HELCOM offers a monitoring manual to facilitate monitoring and reporting by the coastal states in order to improve the usefulness of their information [34], which it uses in addition to scientific research. Its main enforcement instruments are its reports [e.g. on the eutrophication status in [35]], which are not formally not intended to monitor compliance, but to coordinate environmental monitoring, e.g. HOLAS I and II [36,37]. If we consider the track record of the coastal states, we see a mixed picture. On the one hand, the HELCOM nutrient reduction targets set in the nineties were not achieved [38]; on the other hand, we see progress [39]. For instance the pollution hotspots, which were listed by HELCOM in 1992 as part of the Baltic Sea Joint Comprehensive Environmental Action program, are gradually removed from this list. This shows that the limited means of HELCOM can be effective in combination with cooperation and support and action by the coastal states, the EU and NGOs [40].

The EU also plays a role in promoting compliance. As stated above, it tracks progress regarding the implementation of its Strategy for the Baltic Sea and the Action Plan [41]. But its role goes much further. As the EU is a party to the Helsinki Convention, it has become part of the EU legal order and is implemented and supplemented by EU legislation and funding. Therefore, in case of non-compliance with the HELCOM nutrient caps, the EU Commission can enforce compliance in the context of the MSFD obligation for Member States to take cost-effective and feasible measures to achieve the good environmental status in their marine waters. Unless non-compliance is considered justifiable, the European Commission can bring infringement procedures for non-compliance before the European Court of Justice, which can result in sanctions.

7. Conclusions

As climate change exacerbates existing pressures, it is not surprising that adaptation efforts are directed at currently felt ecological and socio-economic threats to the Baltic Sea environment. One of the main adaptation challenges for the Baltic Sea is eutrophication, as it is expected to worsen due to climate change and therefore requires further reductions of nutrient inputs. Another emergent climate change challenge is the increased risk of floods. In the Baltic Sea region, adaptation is mainstreamed into sectoral plans developed by HELCOM and the EU, but scientists also developed an adaptation strategy for the Baltic Sea (Baltadapt) and the coastal states adopted strategies as well.

The underlying assumption of these overarching adaptation strategies seems to be that knowledge will lead to action. This is also the underlying assumption in EU legislation, like the FD and the MSFD. Based on results from the past in the implementation of the WFD, this assumption is unlikely to be correct [16,42]. Thus, while it is laudable that holistic goals (good environmental status; reduction of the adverse effects of floods) are set and assessments are made, more is needed. Progress in achieving these objectives is hindered if the Baltic Sea coastal states are not ambitious in taking action in response to the

results of these mandatory assessments, public disclosure and participation and fail to coordinate their actions within their marine region. This is confirmed by a critical 2013 report by the Boston Consulting Group with regard to the sluggish implementation of environmental protection measures in the Baltic Sea.

With regard to flood risks, it is remarkable that the adaptation strategies focus on socio-economic adaptation measures. Given the rather vague objective of reducing adverse effects of flooding, the CBSS could provide more guidance in the development of shared measures across the marine region. Yet the Baltic Sea offers a glimpse of hope with regard to improving environmental protection through cooperation. In order to counter the impacts of climate change, HELCOM set stringent nutrient caps for each state in order to achieve a good environmental status of the Baltic Sea change, a shared EU and HELCOM goal. Achieving this goal requires cooperation among states and the willingness to commit and to act to comply with international standards. Let us hope this time the coastal states manage to reduce their nutrient inputs. Even if compliance with the nutrient caps may not be sufficient to achieve good environmental status with regard to eutrophication by 2020 or 2021, reducing nutrient inputs in the Baltic Sea constitutes a step in the right direction.

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Glossary

Baltadapt: The 2013 Strategy for Adaptation in the Baltic Sea Region
CBSS: Council of the Baltic Sea States
EUSBSR: The 2009 EU Strategy for the Baltic Sea Region
FD: Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks (Floods Directive)
MSFD: Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive)
NDEP: Northern Dimension Environmental Partnership
UNFCCC: United Nations Framework Convention on Climate Change
WFD: Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy (Water Framework Directive)